Chapter 10: Natural Systems

Chapter Overview

Lynchburg residents attach a high value to preserving and enhancing their natural and environmental resources. For many residents, the beauty of the City is an essential part of their quality of life. The City is known for its hills and steep ravines that harbor rich woodlands, wildlife, and rare plants. The James River, Lynchburg's most prominent natural feature, provided the City's early reason for being—a source of water power and a transportation vehicle. Now the James River is becoming the focus for downtown revitalization

James River: Pedestrian bridge to Percival's Island nature trail

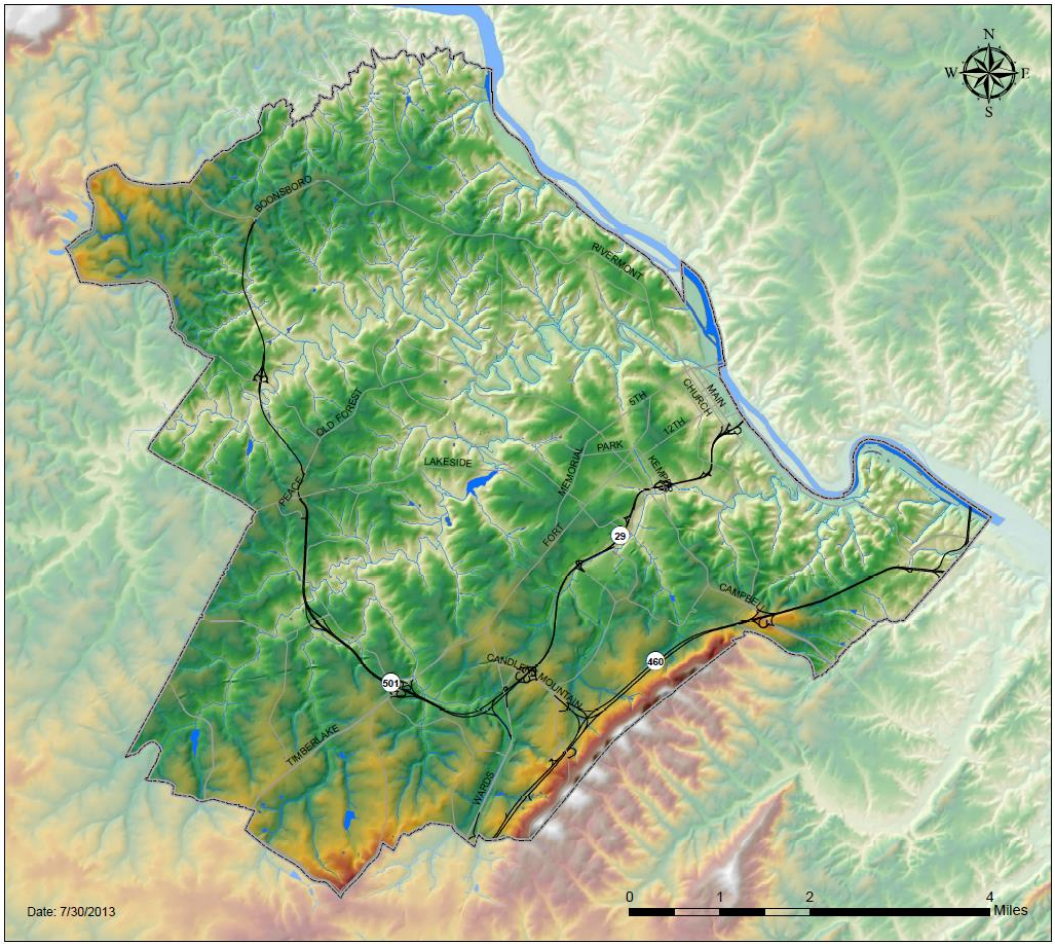
As the City has developed, pressures have increased to build on sensitive natural lands. Citizens have expressed a desire to increase efforts to protect natural and environmental resources and to move towards a more sustainable community. Lynchburg embraces sustainability and recognizes that elements such as environmental stewardship, financial responsibility, economic development and social impact must serve as a filter for the City's decision making and development of policy. Only through appropriate consideration of these principles will Lynchburg provide its residents with the opportunity to meet the needs of the present without compromising the ability of future generations to meet their needs. This Plan strives to lead Lynchburg towards a more sustainable future by protecting, and promoting and restoring the City's outstanding natural resources.

Geology, Topography and Soils

The natural features of Lynchburg, including the geology, topography, and soils, have a significant impact on the suitability of the land for development. The variable rock types underlying the City have formed the hills and steep ravines of the central city, the

imposing Candlers Mountain along the City's southern border, and the foothills of the Blue Ridge Mountains that begin in the Reusens area along the northwest border. Those areas of the City that feature a highly dissected landscape of narrow ridges and steep-sided valleys present a challenge to developers, especially for large retail and industrial buildings needing large areas for parking. Clearing and grading of steep slopes can result in significant soil erosion and sedimentation of streams, though to accomplish much additional development in Lynchburg, some steep areas will likely need to be graded. Exhibit 10-1 illustrates the topography of the City.

Exhibit 10-1: Topography



Some areas of the City are so steep that they remain wooded and relatively natural today. Many steep-sided stream valleys harbor a rich diversity of plant and animal life. The amount and extent of forested areas is quite unusual for a city of Lynchburg's size and age. Large areas of woodland remain on Candlers Mountain, in the Tyreeanna area, in the vicinity of the Blackwater Creek Natural Area and Peaks View Park, and in the Cheese Creek and Judith Creek watersheds. These areas have the potential to be connected to create a natural greenways system that builds on the success of the Blackwater Creek Natural Area.

Steep slopes such as these are challenging to develop

Water Resources

Lynchburg is drained by eleven streams. Judith, Pigeon, Blackwater, Fishing, and Opossum Creeks all drain directly to the James River, while Ivy, Cheese, Tomahawk, Burton, and Dreaming Creeks are tributaries of Blackwater Creek. By far, Blackwater Creek has the largest watershed area affecting the City and extending into neighboring Bedford and Campbell counties.

Both the frequency of bank overflow and flood elevations have risen in these streams. The increased impact of floods appears to be due to increased urbanization of stream watersheds, not only in the City, but also in neighboring counties. This resulted in an update of the City's floodplain mapping with new FEMA 100-year floodplain maps being adopted by the City, effective June 3, 2008. While the City has permitted development to occur in the 100-year floodplain in the past, it should limit new development in the floodplain in the future and seek to protect existing development that may be affected by flooding. As required by dam safety regulations, the City also should monitor and update dam break inundation zones shown in Exhibit 10-1. Due to the potential impacts to downstream properties this map should be updated regularly as new information becomes available for public and private regulated dams.

Blackwater Creek: One of eleven creeks in Lynchburg.

The water quality of several streams, including Blackwater, Burton, Fishing, Ivy, Judith and Fishing Tomahawk Creeks and the James River, has been found to violate the state and federal water quality standard for bacteria, specifically Escherichia coli (E. coli), a type of fecal coliform, which indicates contamination from human or animal wastes. The bacteria levels in these streams exceed those allowed by Virginia's Water Quality Standards. As a result, theVirginia Department of Environmental Quality (DEQ) has placed these streams on the priority list of impaired waters pursuant to Section 303(d)(1) of the Federal Clean Water Act. The DEQ, in cooperation with local stakeholders performed a study called Total Maximum Daily Load (TMDL) to determine the total amount of a pollutant from point and non-point sources that the streams can handle daily and still meet water quality standards for their designated uses. The study, "Bacteria TMDL for the James River Basin" dated August 2007 identifies Lynchburg's Combined Sewer Overflows as a major point source contributor to the E. coli impairment. The study also states that the majority of the impairment originates from non-point sources, which primarily include: agriculture, residential and forested areas. Non-agriculture anthropogenic non-point sources include loadings from straight pipes, leaking sanitary sewers, failing septic systems and pet waste.

The bacteria TMDL has not yet finalized due to pending revisions to the CSO Long Term Control Plan (LTCP). If the revised LTCP is approved, the completion of the CSO Program will greatly be accelerated potentially saving the citizens of Lynchburg over $200 million. The revised LTCP would dramatically change the direction of the CSO Program. The current plan includes completely separating the storm and sanitary sewer systems with the goal of eliminating the combined sewer overflows. The proposed plan would capture and convey most of the remaining combined stormwater and wasterwater flow to the Lynchburg Regional Wastewater Treatment Plant (LRWWTP). While some overflows would still occur through permitted overflow points, water quality standards would still be met in part due to capturing much of the stormwater in the combined area and treating it at the LRWWTP.

Exhibit 10-2: Dam Inundation Zones

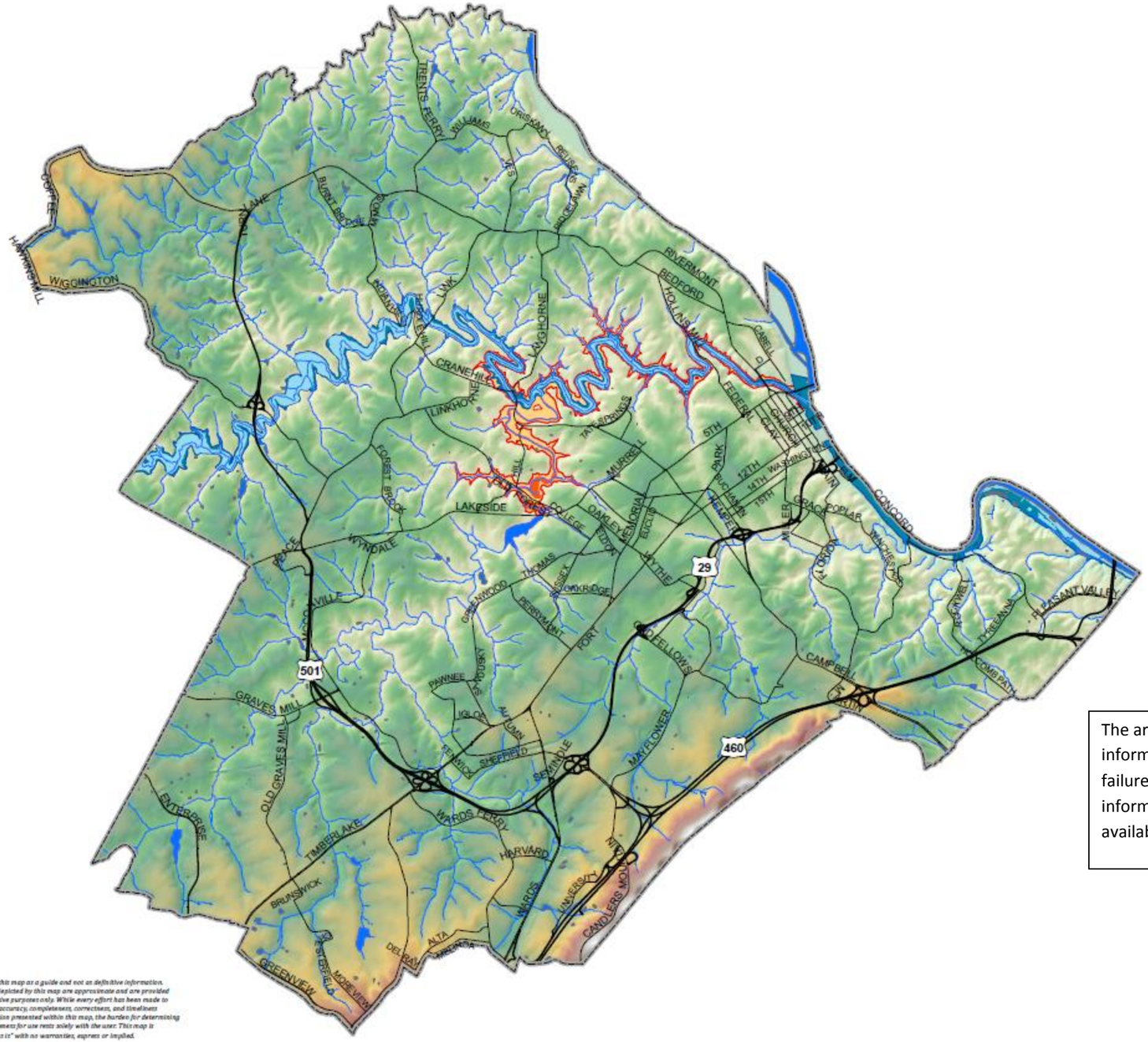


Exhibit 10-2
Dam Inundation Zones

September 2013

- Ivy Lake SD
- Ivy Lake PMFnb
- Ivy Lake PMFbr
- Sunny Day Breach
- PMF No Breach
- PMF Breach

Elevation

Height Feet

High : 834

Low : 132

- Highway
- Major Arterial
- Minor Arterial
- Collector
- Water

The areas shown on this map include currently available information on areas subject to inundation from dam failures. This map should be supplemented with information from other dams as soon as it becomes available.

Prepared by:
Department of Community Development
Planning Works

Please use this map as a guide and not as definitive information. The areas depicted by this map are approximate and are provided for illustrative purposes only. While every effort has been made to ensure the accuracy, completeness, correctness, and timeliness of information presented within this map, the burden for determining appropriateness for use rests solely with the user. This map is provided "as is" with no warranties, express or implied.

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In conjunction with the revisions to the LTCP, the Bacteria TMDL is also being revised in order to accurately reflect the changes in the CSO Program. Upon completion of the TMDL an Implementation Plan (IP) , which develops bacteria load reduction goals from each contributing sector in each watershed, will then be developed through collaboration with DEQ and other stakeholders.

The EPA, DEQ and DCR are implementing various regulations and requirements related to reducing nutrient (phosphorus and nitrogen) and sediment pollution as part of the Chesapeake Bay TMDL. Through the Watershed Implementation Plan (WIP) various sectors including regulated and unregulated sectors, have specific pollution reduction requirements. The regulated goals are incorporated into the City's Virginia Pollution Discharge Elimination System (VPDES) permits including the Regional Wastewater Treatment Plant's Nutrient General Permit and the Small Municipal Separate Storm Sewer System (MS4) Phase II General Permit. Additionally, the unregulated urban areas of the City also have specific reduction goals. All of which must meet certain timelines established by the permit cycles or the Bay target dates of 2017 and 2025. One significant outstanding issue is the ongoing study of the James River Chlorophyll-A standard. The outcome this study may result in significant additional nutrient reductions especially in the stormwater and wastewater sectors and could require a major capital investment in the LRWWTP. Lynchburg will continue working to meet its regulatory obligations and water quality goals.

As a result of these water quality challenges, the City has initiated the development of a strategic plan. The plan will be the foundation for decisions to cost effectively meet the goals of the Bacteria and Chesapeake Bay TMDLs, various other water quality regulations and permit requirements.

Air Quality

Lynchburg continues to maintain excellent air quality and DEQ monitoring confirms Lynchburg is compliance with federal ambient air quality standards. In addition, the American Lung Association releases the "State of the Air" report every three years which uses measurements taken by the U.S. Environmental Protection Agency's Air Quality System. In 2013, Lynchburg received an A rating for 24-hour particulate pollution and exceeded the standard for annual particulate pollution – which can include emissions from factories, vehicle exhaust and the like. The City's efforts to improve its mass transit, bicycle and pedestrian systems, implement various "anti-idling" transportation features such as roundabouts and reduce energy consumption through building design, energy audits and efficiency efforts have been key. Land use patterns that promote redevelopment, connectivity and an appropriate mix of uses also reduce emissions while providing for more efficient service delivery and cost savings.

Understanding the Value of Natural Systems

There is a keen interest among citizens in improving the environmental quality of Lynchburg and protecting its natural resources. The first step in protecting these

resources is to understand their value in providing a healthy environment. Monitoring and managing the environmental resources within the City can require a significant amount of resources. Many cities and counties across Virginia are developing environmental databases in their GIS systems to help them plan environmentally sensitive communities. Most cities map topography, soils, water bodies, floodplains and parks.

City officials and citizens could benefit from more comprehensive information about effective environmental protection techniques. City staff from a variety of departments should be kept abreast of environmental trends and practices through training, conferences, workshops, and other educational forums. The City has also established a panel of local experts to serve on a Natural Resources Advisory Committee and/or a Stormwater Advisory Committee to evaluate and comment on natural resource-related policies.

Resource Management & Protection

The City desires to improve the protection and management of its natural systems in order to create a truly sustainable community. There are a number of approaches that the City may choose to pursue, including environmental performance standards, incentives for private actions, **conservation / open space easements**, education and awards programs, and direct City actions.

Poorly landscaped (left) and well-landscaped (right) stormwater management facilities

As described above, it is important for the City to consider environmental performance standards for new development and redevelopment, not only to ensure compliance with state and federal standards, but also to address the protection and management of important natural resources. Through the application of reasonable standards limiting the development of floodplains, wetlands and streamside steep slopes, these important resources could be preserved. Standards for the construction and maintenance of stormwater management facilities would ensure that flooding levels are kept in check and that the water quality of stormwater discharges is addressed. A major concern raised by citizens is the design, quality, and upkeep of stormwater management facilities. During the Community Character Survey, poorly functioning stormwater management facilities received some of the lowest rankings. Maintenance and upkeep

of such facilities are directly linked to their effectiveness in managing stormwater. The City should adequately enforce post construction maintenance agreements on private stormwater best management practices to ensure that they are performing as designed.

Incentives, rather than codified standards, may be more appropriate for other efforts to achieve sustainable development. For example, the City should continue to promote the recycling and re-use of existing buildings and offer incentives for the cleanup and redevelopment of brownfield sites, including tax abatement, density/intensity increases, and contributions to infrastructure and public amenities. Density increases or other incentives for private developers should be available in a variety of zoning districts, not just the Traditional Neighborhood Development and Planned Unit Development zones, in exchange for the preservation of significant wooded open space, unique species areas or critical habitats, and for green building design. The City should also continue to work with property owners desiring to participate in the stormwater credit program.

The City should also employ softer techniques for natural resource protection such as educational programs and programs to recognize private environmental initiatives. The City supports a variety of environmental education efforts including interpretive signage, programming and design workshops. A number of communities in Virginia also use awards programs to promote green development. These programs could be used to highlight a variety of topics including the eradication of invasive plant species developments that incorporates green building techniques, water conservation initiatives and various efforts to protect steam valleys and woodlands.

Conservation/Open-Space easements are legal documents made between a landowner and a public body such as a land trust or government agency. The most common entities that serve as an easement holders include the Virginia Outdoors Foundation, Virginia Department of Forestry and the Department of Historic Resources; however, the city could also consider being a holder of the easement. The public body holding the easement serves as the enforcement agent for any violations of the terms of the easement. The easements allow land to be continually held in private ownership, but generally restrict the development rights of the property. Certain traditional uses such as a single-family dwelling, farm, forest, open space and/or natural area would be allowed. The easement is legally recorded and bound to the deed of the property permanently.

While the city generally supports conservation/open space easements, careful consideration is needed when determining location, size and number within the city limits. The city has limited available land resources. A careful balance between conservation/open space easements providing a true public benefit and future development needs of the city must be established.

When considering whether to support or hold a conservation/open space easement, the city should consider the following criteria:

- **Proximity to other conservation/open space easements.**
- **Viewshed protection.**

- **Presence of wetlands.**
- **Groundwater protection.**
- **Forest cover.**
- **Absence of city water/sewer availability.**
- **Floodplain.**
- **Slopes of 25% or greater.**
- **Stream protection.**
- **Soil type.**
- **Rock outcroppings.**
- **Protection of wildlife habitat.**
- **Historical significance.**
- **Current participation in the city land use deferral program.**
- **Currently zoned R-C, Conservation District.**
- **Currently designated as Resource Conservation on Future Land Use Map.**

If deemed appropriate for placement in a conservation/open space easement, the property should be designated as Resource Conservation of the Future Land Use Map.

Finally, the City itself could become actively involved in natural resource protection and management. When the City constructs a building, a parking lot, a road, or a park, for example, it should strive to protect wooded areas, steep slopes, and floodplains to the extent feasible. The City should use green building techniques and demonstrate well-landscaped stormwater management facilities that not only serve as best management practices, but also provide visually pleasing amenities. The construction of Heritage High School and the Juvenile Detention Group Home will continue the standard of City buildings that are built with sustainable guidelines. Citizens in public meetings voiced a great deal of support for City establishment of a greenway program to expand the James River Heritage Trail and the Blackwater Creek Natural Area and to establish similar areas along other City streams. The greenway program should promote the purchase and accept donations of open space for resource protection along streams. The City could also use environmental performance standards to obtain the dedication of stream valley open space for the greenway program in developing and redeveloping areas.

A Regional Approach

Since nature does not respect political boundaries, regional cooperation is essential in addressing environmental problems and managing natural systems. The expansion of existing partnerships should be encouraged to address regional environmental issues such as stormwater (in progress), greenways, scenic resources, water and air quality, and invasive species. Collaboration between state agencies, local and regional environmental groups, and colleges and universities may prove more effective in addressing resource protection and management. The regional stormwater management effort is a good example of environmental planning that extends across

jurisdictions and utilizes grant funds from the Virginia Department of Conservation and Recreation. The City should continue to pursue other funding opportunities to monitor and manage environmental resources.

Information about the health of the natural systems in the City and region is dispersed among various groups, and data collection is currently a cooperative effort. There is no local repository for information. Information-sharing responsibilities and data collection protocols should be established between the various groups so that an annual report on the state of the City's and region's natural systems and environmental health can be produced.